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ANL Frameworks / Mesh Generation Project

Long-Term Planning 2009

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Introductions

- ANL
  - Alvaro Caceres
  - Dmitry Karpeev
  - Hong-Jun Kim
  - Rajeev Jain
  - Robert Smith

  - Not here:
    - *Iulian Grindenau*

- UW
  - Brandon Smith
  - Chaman Singh Verma
  - Jim Porter
  - Jason Kraftcheck
  - Steve Jackson

  - Not here:
    - *Paul Wilson*
    - *Shengyong Cai*

Goals

- Reasonably-detailed plan, in outline form
  - I'll translate to some sort of documentation
- Sense of shared destiny
  - There is great opportunity right now, let's all share it
- Individual understanding of the vision, technical plan, and your role in it
  - For some this may evolve in time
- Individual buy-in on the overall plan

Expectations, Ground Rules

- Long-term planning is difficult, especially now
  - Lots of new people, some with less experience
  - Other factors (distance, funding uncertainty, strong-willed lead, etc.)
- Ground rules help even the playing field

- Expectations:
  - If you have opinions, this is the time to make them known
  - Current plans/deadlines/directions firm, but will loosen with time
  - There's no “I” in TEAM, nor in HERD

- Ground rules for planning exercise:
  - Show respect for both new ideas and current directions
  - Value diversity
  - Try to think both small and big picture
  - Maximize planning quality in the fixed amount of time we have for it

Current Sponsors, ANL & UW, FY10

- NEAMS (1200k)
  - Framework for multi-physics analysis, mesh generation, enabling tech
- ITAPS (450k)
  - Interfaces & tools for high-performance, parallel scientific computing
- SISIPHUS (Ice Sheets) (200k)
  - Component-based ice sheet modeling
- TOTAL/Hutchinson Rubber (70k)
  - Advanced mesh generation algorithms
- Mesquite, LDRD, other misc (~150k)
  - Applications of ITAPS components/tools

Technical Area Summary, Near-Term Tasks

- Interfaces (iXxx)
  - MOAB: parallel representation, release 4.0, source restructure
  - CGM: cubit 11.x update, release 11.x, pyGeom
  - iField: abstractions, data model, implementation
- Mesh generation
  - MeshKit (algorithms, design)
  - Parallel tet meshing
  - Embedded boundary meshing
  - Mesh refinement (higher-order)
- Documentation
  - Parallel mes
- Solution coupling
  - Higher-order shape functions
  - Parallel scaling
  - Normalization/conservation
  - Applications
- NEAMS/reactor simulation
  - Nek, UNIC integration
  - 1-way UNIC-Nek coupling
  - Tjunction Nek benchmark
  - ABTR meshes/scripts
  - StarCCM+ interface
  - DeCart support
  - Framework
  - Scaling

Project Name, One Sentence Description

Applications

- *Nek*
- *UNIC*
- *VHTR/Safety*
- *NEAMS/SHARP*
- *Fuels campaign*
- *DAG-MCNPX*
- *Space reactors*
- *TOTAL (Hutchinson rubber)*
- *SISIPHUS (Ice Sheets)*
- *SciDAC Accelerators*